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Press release / 03 June 2020

RESIST: 'RESilient transport InfraSTructure to extreme events

RESIST Mid-term dissemination results

During the 18 month period, using as input the extracted technical and user requirements, a concrete system architecture was defined including all the subcomponents of RESIST, which operate either on the inspection field (aerial robotic systems, computer vision systems for defects identification and 3D point cloud creation, as well as onboard inspection sensors and sensor modules mounted by the aerial robotic system on the infrastructure) or the RESIST's system backend (components for structural vulnerability, risk assessment and management, mobility continuity, and cyber-security). The RESIST system architecture will guide the developments of the project throughout its lifecycle.

In the detail, the design of the aerial robotic system was developed equipping the different inspection sensors in order to operate in tunnels as well as bridges. Several prototypes have been developed and flight tested, and their results incorporated in the final design. RESIST aerial robotic system comprises of two aerial robots: the visual inspection robot and the contact inspection robot. In order to realize contact width measurements of crack surface opening, a high-resolution measurement system based on ultrasonic waves and a Micro Electro-Mechanical Systems (MEMS) sensor have been designed and developed to be integrated on the aerial robot.

Additionally, the design and first prototype of the stereo camera hardware module has been developed, the first versions of the image-based 3D reconstruction software, the laser system and reflector have been integrated in the designs, the cognitive computer vision system as well as the ground control station have been developed with the integration already considered in the design of all components in mind.

The network architecture designed by the consortium was done so in a way to allow for the forwarding of critical messages to operators on the field, to civilians, to first responders and in general with the mind to interconnect the control station of the road operator with all the parties involved on an incident. With regards to security, a detailed cyber security analysis has been carried out for the RESIST and pilot assets based on the architecture as well as information received from the pilot owners. The identified threats and risks of this assessment have been collected and mitigation/prevention techniques have been defined. A security assurance model is being developed.

During this period, partners have been working on the development of the module on Assessment of the Highway Users' Behaviour Under Stress that will provide input to the mobility continuity module and the control centre. The module will include psychological and behavioural dimensions of safety and their impact on the effective operational capacity and communication of the control centre with the users.

For the integration of all the components of RESIST, a first prototype of the RESIST Integration Environment was developed, a web desktop application to provide a single point of access for all applications of RESIST, including also capabilities like application and user management. Also, in terms of data integration, a platform and an API were developed to gather and store data collected during inspection or shared between the components of the project.

When an earthquake, or a structural failure, will be simulated in the Italian Pilot (St. Petronilla Tunnel of the A32 Highway), will be necessary to transmit current traffic conditions data to allow the best possible management of emergency and rescue operations. Remotely Piloted Aircraft System (RPAS) for Inspection will also be tested in a tunnel in absence of GPS signal, while security of communication will be secured by RedComm infrastructure and Wi-fi network.

Dissemination activities during the 18 month period can be found here.

For more details on RESIST, visit http://www.resistproject.eu/
or contact the Dissemination and Communication leader Dr Adewole Adesiyun (adewole.adesiyun@fehrl.org).

RESIST on Social Media: Twitter - LinkedIn
Register here to receive the **RESIST Newsletter**.

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Project Fact Sheet

Duration: 36 months (1st September 2018 – 31st August 2021)

Total budget / EC contribution: 4 956 810,00 Eur.

Call: MG-7-1-2017 Resilience to extreme (natural and man-made) events

Coordinator: Institute of Communication and Computer Systems (ICCS), Greece.

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ICCS, Greece
EOAE, Greece
TECNOSITAF, Italy
FEHRL, Belgium
ED, Luxembourg
FADA-CATEC, Spain
USE, Spain
CNR, Italy
FORTH, Greece
GUF, Germany
TUG, Austria
BGU, Israel

RISA, Germany
DBA, Greece
ERRA, Greece
STS, Switzerland
LOGYSYSTEMS, Belgium

Project website: http://www.resistproject.eu/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 769066.